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The epidemiology of UK Military Exercise SAIF SAREEA 3; future planning for hot climates

Key words

Saif Sareea 3, hot, desert, epidemiology, Role 1

Key messages

- Epidemiological data for Ex SS3 is presented by phase, and compared against previously used estimates.
- Casualty figures during 'In-load and acclimatisation phase' were 9.4% of the force per week, compared to usual planning estimates of 5%
- Event codes remained quite static throughout the exercise, with 'non-battle, non-sport', 'dermatology', 'other' and 'sport' most common, with 'gastrointestinal', 'climatic', 'psychiatric' and 'upper respiratory tract infections' accounting for the greatest loss of productivity.
- Use of EPI-NATO2 PLUS data enabled capture of follow up consultations for future use

Abstract

Introduction. Epidemiological data capture from military exercises and operations can highlight treatment requirements specific to operating in certain environmental conditions. Such data is invaluable to enable accurate planning for future exercises. Epidemiological data were collected during Exercise SAIF SAREEA 3 (SS3) to provide insight into medical provision requirements for low-tempo military operations in hot, desert climates. **Method.** Epidemiological data was collected from all consultations conducted during the exercise within the LAND Medical Reception Station (MRS), 24 Aug 18 to 14 Nov 18, using Epi-NATO surveillance systems. **Results.** Of the 1414 total consultations recorded, 759 were first presentations and 665 were follow up consultations, with 35 referrals made to hospitals. 1348 days of limited duties were given and 258 working days were lost. The most common coding reported for consultations were '*non-battle non-sport related injuries*', '*sport related injuries*' and '*dermatological*'. **Discussion.** The data highlights the most common cause of injuries and the role of assets such as dental, sexual and mental health services for future deployments. A number of explanations are considered in relation to the patterns identified and the effect on future planning for working in hot climates. Furthermore, Ex SS3 had reduced numbers of personnel requiring Role 2 MTF or HN MTF services, which again this raises further considerations for future deployments.

Introduction

Ex SAIF SAREEA 3 (SS3) was a PJHQ-sponsored Brigade level exercise that took place in Oman during the latter half of 2018. The aim was to test the UK Defence's combined ability to deploy a Joint Task Force to Oman, and operate in austere and challenging conditions. It deployed Real Life Support (RLS) on a scale last used during Op HERRICK (the British Army's warfighting operations in Afghanistan). RLS supported Army troops (ground forces) in the form of four static and four mobile Role 1 Pre-Hospital Treatment Teams (PHTTs) across Oman, and a Medical Reception Station (MRS) and Role 2 Field Hospital based in Camp Shafa.

The deployment of military personnel and equipment to hot, austere, desert environments present substantial challenges with regards to medical provision. The aim of the epidemiological data captured from SS3 was to allow for better medical preparation and planning for future deployments to similar novel environments.

Study Population

There were 2550 Army personnel deployed including 376 medical personnel in support of the exercise. The Population at risk (PAR) in Camp Shafa rose and fell with movements throughout Oman, particularly to and from the training area, with a peak of 1664 and a low of 234 personnel.

Method

Epidemiological data was collected by MRS staff from all 1414 consultations conducted during the exercise (24 Aug 18 to 14 Nov 18) within the Army MRS. Data were collated within a spreadsheet and analysed to identify trends in presentations. Estimates of accurate PAR were used based on PJHQ data and location specific records.

Epidemiological data were captured by Epi-NATO 2 or Epi-NATO 2 PLUS surveillance systems within the Army Medical Reception Station, as discussed in an accompanying publication [1]. Briefly, data was collected by the Epi-NATO 2 surveillance system in which initial consultations are given codes based on clinical presentation with a phonetic (e.g. Alpha) and a descriptor (e.g. Gastro-intestinal infection) [2-5]. Where consultations fell outside this coding scheme, or for any follow up consultations, data were captured by Epi-NATO 2 PLUS using the additional event codes Sierra – Other Medical, and Tango – Administration as well as recording the number of days light duties (LD) given, number of days bedded down (BD), or working days lost, and number or referrals to hospital units.

The data captured over the exercise period was broken into three phases; 'in-load and acclimatisation' phase (24 Aug to 29 Sep 18), 'exercise' phase (30 Sep to 31 Oct 18) and 'close down' phase (01 Nov to 14 Nov 18). The five most common coding criteria noted during each of these phases was assessed and any additional notable trends or observations recorded.

This data was also assessed relative to the given casualty figures from Exercise Saif Sareea 2 of 5.6% of the population per week [6] and the casualty estimate guidelines from the Staff Officers Handbook on exercise, where 'daily (first) presentation at primary care is 1.4% of the force, 1.35% for disease, 0.05% for NBI' when deployed in the field, and 5% of the force when in a base location [7]. Follow up attendances are not considered.

Results

During SS3, causes of medical conditions covering the spectrum of Epi-NATO surveillance were recorded with the exception of *Echo*, *Hotel* and *Romeo* (Table 1). The five most common causes of medical consultations were *Papa* – Non-battle related injuries (non-sport) (34.4%), *Sierra* – Other (12.7%), *Oscar* – Non-battle related injuries (sport) (12.6%), *Juliet* - Dermatological disorders (12.6%) and *Bravo* – Upper Respiratory Tract infection (UTRI) (5.9%) (Table 1).

Table 1 – Consultation details from MRS R1 SHAFA between 24 Aug – 14 Nov 18.

Event to report = cause of medical consultation, LD = Days of light duties, DB = Days of bedding down (working days lost), R2/HN = Role 2 field hospital/Host Nation hospital.

Item code	Event to report	Total consults (% total)	No. of first consults	No. of follow up consults	No. of LD given (% total)	No. of BD given (% total)	Referral to R2/HN (% total)
<i>Alpha</i>	Gastro-intestinal infection (GII)	32 (2.3)	29	3	12 (0.8)	73 (28.3)	1 (2.9)
<i>Bravo</i>	Upper respiratory tract infection (URTI)	84 (5.9)	64	20	41 (3.0)	29 (11.2)	2 (5.7)
<i>Charlie</i>	Reactive airway disease (RAD)/Asthma	35 (2.5)	11	24	54 (4.0)	2 (0.8)	2 (5.7)
<i>Delta</i>	Influenza-like illness (ILI) and Lower respiratory tract infection	4 (0.3)	1	3	5 (0.4)	2 (0.8)	0 (0)
<i>Echo</i>	Fever of unknown origin	0 (0)	0	0	0 (0)	0 (0)	0 (0)
<i>Foxtrot</i>	Haemorrhagic illness	17 (1.2)	14	3	0 (0)	0 (0)	0 (0)

<i>Golf</i>	Musculoskeletal disorders (MSD)	30 (2.1)	15	15	29 (2.1)	1 (0.4)	0 (0)
<i>Hotel</i>	Acute neurological disorders	0 (0)	0	0	0 (0)	0 (0)	0 (0)
<i>India</i>	Psychiatric or mental disorders	24 (1.7)	7	17	55 (4.1)	6 (2.3)	0 (0)
<i>Juliet</i>	Dermatological disorders	178 (12.6)	115	63	138 (10.2)	7 (2.7)	2 (5.7)
<i>Kilo</i>	Sexual exposure	20 (1.4)	12	8	14 (1.0)	6 (2.3)	0 (0)
<i>Lima</i>	Dental disorders	73 (5.2)	48	25	4 (0.3)	0 (0)	0 (0)
<i>Mike</i>	Animal bites and stings	0 (0)	0	0	0 (0)	0 (0)	0 (0)
<i>November</i>	Battle related injuries	3 (0.2)	1	2	3 (0.2)	0 (0)	0 (0)
<i>Oscar</i>	Non-battle related injuries (Sport)	178 (12.6)	66	112	241 (17.9)	6 (2.3)	9 (25.7)
<i>Papa</i>	Non-battle related injuries (non-Sport)	487 (34.4)	210	277	578 (42.3)	64 (24.8)	14 (40)
<i>Quebec</i>	Climatic or environmental injuries	45 (3.2)	28	17	67 (5.0)	26 (10.1)	1 (2.9)
<i>Romeo</i>	Unusual or exceptional event reported within last 7 days	0 (0)	0	0	0 (0)	0 (0)	0 (0)
<i>Sierra</i>	Other Medical Reason	180 (12.7)	117	63	107 (7.9)	36 (13.6)	4 (11.4)
<i>Tango</i>	Admin	24 (1.7)	21	3	0 (0)	0 (0)	0 (0)
Total		1414	759	655	1,348	258	35

To determine phase specific medical requirements, the five most common medical conditions, as well as consultation numbers, were assessed for each of the three phase of the operation; ‘in-load and acclimatisation’, exercise phase’, and ‘close down’ (Table 2). This allowed easier comparison against the SOHB medical estimates for future planning purposes. It was considered that the acclimatisation period may significantly influence casualty numbers when deployed in hot climates. The 5 most common causes of consultation remained constant throughout all phases, with the exception of ‘close down’ phase in which *Bravo* – Upper respiratory tract infection was replaced by *Tango* – Administration. The locations of the codes relative to each other changed a little between operational phases.

Table 2 – Top 5 Codes and total consultations in each phase of SS3 collected by Epi-NATO 2 PLUS

Event to report = cause of medical consultation

Top Five Presentations	In Load and Acclimatisation phase		Exercise phase (Battlegroup deployed in the Field, Combat Service Support group in Shafa)		Close down phase	
	24 Aug to 29 Sep 18 (37 days)		30 Sep to 31 Oct 18 (32 days)		01 Nov to 14 Nov 18 (14 days)	
	Event to report	No. of consults (%)	Event to report	No. of consults (%)	Event to report	No. of consults (%)
1	P	174 (32)	P	250 (38)	P	63 (36)
2	J	84 (16)	S	91 (14)	O	45 (26)
3	S	64 (12)	J	81 (12)	S	15 (9)
4	O	59 (11)	O	75 (11)	J	13 (7)
5	B	47 (9)	B	35 (5)	T	12 (7)
First presentations	350		322		87	
Follow up consults	189		378		88	
Total consults (Avg per day)	539 (16.78)		700 (21.88)		175 (12.5)	
Avg PAR (avg consults per PAR)	621 (0.87)		1194 (0.59)		724 (0.24)	
% PAR presentation per week (% First presentations)	14.5 (9.4)		11.7 (5.4)		12.1 (6.0)	

To identify the most frequent causes of reduced personnel productivity, the most common causes of medical consultations resulting in days of light duties (LD), days of bedding down (BD) and referrals to Role 2 Field Hospitals or Host Nation Support were assessed (Table 3). Whilst the most frequent cause of days lost shares similar coding with the most frequent presentations (Table 2), it also includes coding criteria *Alpha* – Gastrointestinal infection, *Charlie* – Reactive airways disease (RAD)/Asthma and *Quebec* – Climatic or environmental conditions (Table 3).

There were observed changes in the average number of consultations per week across the operational phases; ‘in load and acclimatisation’ (14.5% total, 9.4% initial), ‘exercise’ (11.7% total, 5.45 initial) and

‘close down’ (12.1% total, 6.0% initial) (Table 2). Additionally, the number of consultations per PAR fell over the course of the operation, from ‘in load and acclimatisation’ (0.87), ‘exercise’ (0.59) and ‘close down’ (0.24) (Table 2).

Table 3 – Top 5 Codes for additional data captured in EpiNATO-2 PLUS

Event to report = cause of medical consultation, LD = light duties given, BD = days bedded down, R2/HN = Role 2 field hospital/Host Nation support.

Top Five Presentations	LD days given		BD days given		Referrals to R2/ HN MTF	
	Event to report	No. of days (%)	Event to report	No. of days (%)	Event to report	No. of referrals (%)
1	P	578 (42.9)	A	73 (28.3)	P	14 (40)
2	O	241 (17.9)	P	64 (24.8)	O	9 (25.7)
3	J	138 (10.2)	S	36 (14.0)	S	4 (11.4)
4	S	107 (7.9)	B	29 (11.2)	B/C/J	2 (6.7)
5	Q	67 (5.0)	Q	26 (10.1)	A/Q	1 (2.8)

The casualty prediction conducted prior to the exercise estimated hospital admissions at 305 cases. However, only 69 referrals were made to hospital from all R1 MTFs (35 from Army MRS); 35 to 22 Field Hospital Unit and 34 to the Host Nation Hospital in Nizwa, 35km away by road.

Discussion

Capture of epidemiological data as part of SS3 highlighted the range and contribution of injuries and illnesses to military personnel deployed on a low-tempo exercise to a dry, hot, desert environment. The most frequent cause of all medical consultations throughout the duration of deployment, as well as the largest cause of reduced personnel productivity, corresponded to the code *Papa* - Non-battle related injuries (non-sport). This coding criteria covers a range of injuries ‘as a result of a vehicle accident or military training (including Adventure Training)’, as well as ‘occupational related injuries; slips and falls and those injuries relating to noise and vibration, blisters from organised tabbing’. [8]

Within this group common presentations during the acclimatisation programme included blisters and ankle injuries. Many deployed individuals on this exercise wore desert boots that were not previously worn in; in addition, many failed to practice good foot hygiene and didn’t deploy with a personal medical kit to manage their feet. Furthermore, as a result of military organised Physical Training conducted on sandy and rocky ground, there were several ankle and knee injuries from individuals running on the uneven and unsupportive surface.

The second most common cause of presentations fell under the coding criteria for *Sierra – Other Medical* reason. However, owing to the broad range of medical presentations included within this code this group cannot be discussed in any detail in this report.

The joint third most common presentations were *Oscar* - non-battle related injuries (sport) and *Juliet* – Dermatological disorder; each accounting for 178 (12.6%) of consultations. With regards to the former, within Camp Shafa two Forward Operating Base (FOB) locker gyms equipped with attachable rigs were available for all base personnel (a minimum of 550 over the course of the exercise). An additional FOB locker gym was also established for use by the Forward Medical Rehabilitation Team (FMRT), as well as unit sourced cardiovascular equipment for sole use by 22 Field Hospital personnel. Small football pitches, running routes and volleyball courts were also established. Many of these sporting injuries required consultations by specialist medical staff within the FMRT for rehabilitative therapy. Indeed, 256 (18.1% of total) and 80 (5.6%) consultations were conducted by a physiotherapist or exercise rehabilitation instructor (ERI), respectively. The frequency of *Juliet* coding was likely due to many of the soldiers experiencing their first overseas deployment and adapting to working in a hot desert environment. As a result of the high level of skin conditions, combined with the limitations of the available medications and stock within 501 modules, additional medication and supplies had to be acquired locally.

Numerous consultations were conducted by specialist medical personnel. 73 dental consultations (*Lima*) were conducted by a dental officer and dental nurse. This team provided a valuable asset to the deployed medical team; in their absence, specialist dental services would have had to be sought through host nation support. Cases of *Kilo* – Sexual exposure were managed by the Advanced Nurse Practitioner (ANP) who specialised in sexual health. It is likely that if future deployments were located closer to large cities and opportunity arose for troops to leave camp, then these numbers would be far greater. It should be noted that whilst the number of cases corresponding to this coding criteria were low, this may not be the case depending on location, discipline, and ‘walking out’ policy compared to other MTFs in Oman.

With regards to trends in medical consultations at difference operational phases, the distribution of 5 most common cases of consultations remained similar over all three operational phases (Table 2). This may be due to the fact that the established population remained the same with many requiring follow up for musculoskeletal injuries and skin conditions from ongoing climate issues. Of particular interest to this publication, coding cases for *Quebec* – Climatic or environmental injuries (3.2% of total) were only seen during the initial ‘in load and acclimation’ phase and into the first two weeks on the ‘exercise’ phase, likely due to effects of adapting and working in the high temperatures during acclimatisation

program and on initial deployment forwards to the training area for the exercise phase. This is discussed further in an accompanying paper to this supplement [9]. This data does provide a differing estimate for first presentation casualty numbers in the in-load phase for a deployment to hot climates of 9.4% compared to the established 5% estimate in the SOHB [74], which should be considered in future medical planning.

There were phase specific fluctuations in consultations figures; between the first and second phase, the number (and proportion) of follow up consultations increased substantially (Table 2). This increase is likely due to the main body of personnel exercising on the training area during this time and leaving the RLS Combat Service Support group in Camp Shafa. In addition, injured members of the Battlegroup were not deployed but retained on camp for follow up treatment during this second phase. The 'exercise' phase was the busiest of the three phases, experiencing the highest average total consultations per day (Table 2).

The average number of consultations per PAR fell over the course of the operation, from 0.87 in the initial phase to 0.24 in the final phase. This is likely due to the nature of the close down phase and awaiting recovery back to the UK where personnel were conducting minimal activity post exercise, allowing for physical and mental recovery by spending a large proportion of their time in airconditioned tented accommodation or not in camp due to attending adventurous training packages elsewhere in Oman. There was a rise in *Tango* – Administration consultations (12%) during this final phase as a number of individuals needed input from the medical team in preparation for travel to their home units in the UK.

It is notable that the most common causes of loss of productivity were not confined to the most common presentations. *Alpha* – Gastrointestinal Infection and *Bravo* - Upper respiratory tract infections (URTI) only accounted for 5.9% and 2.3% of total consultations, respectively. However, they contributed a disproportionately large amount to productivity loss, 11.2% and 28.3%, respectively. In a similar distribution, *Quebec* - Climatic or environmental injuries resulted in a disproportionate amount of light duties and working days lost, 67 and 26 days respectively. This was expected, given the extended 2-week re-acclimatisation process required for any mild heat illness. The low presentation numbers of cases relating to *India* – Psychiatric or Mental Disorders also gave a disproportionate loss of productivity; for 7 patients there were 55 days of light duties given and 6 working days lost. An accompanying paper discusses the increased time commitment and aeromedical evacuation required for these patients [10], which is not represented by our EPINATO statistics.

Although it was estimated that 305 individuals would require Role 2 admission, only 69 referrals to hospital care were made from all Role 1 MTFs (35 from Army MRS). This may reflect the low levels of

trauma and RTC, no battle injuries and having an MRS co-located with good Role 1 care to manage low level 'ward' support not deemed to need Role 2 support.

When comparing SS3 with SS2, there are a number of similarities and differences. SS2 took place over a shorter time period at the same time of year from Sep – Oct 2001, therefore similar temperatures and conditions that serving personnel were exercising in. It involved significantly greater numbers; 22,500 personnel combining land, sea and air forces training in readiness for a joint exercise altogether and was also a multinational exercise with the Armed Forces of Oman [11]. Lessons from SS2 identified that 'large numbers of personnel suffered from heat though few became seriously ill' similar to SS3. There were also complaints from personnel due to not being supplied with desert boots and use of standard issue temperate boots that was 'unsuited to the environment and suffered a high attrition rate'. Therefore, whilst personnel on SS3 deployed with more appropriate footwear for the environment there were other issues experienced on SS3 as discussed.

Recommendations

The data presented here confirms the vital roles of specialist medical staff, such as rehabilitation and dental teams, to maintain personnel fitness during deployment. Furthermore, it draws focus to the additional need for expertise and resources in mental health provision; the inclusion of a Community Psychiatric Nurse (CPN) in the medical staff of future large-scale exercises should be strongly considered.

The large number of dermatological conditions and non-battle, non-sport injuries highlighted a need for better training in simple soldiering skills such as working in boots, foot care and personal hygiene. The low number of hospital referrals might allow for increased reliance on HN facilities to support the MRS. In contrast, where HN resources are less accessible, dermatological medical stocks and contents of 501 modules should be reviewed to ensure sufficient treatment provision.

In line with these recommendations, future deployments may consider the inclusion of a 'hot climate' module. Such a module could be tailored for Disease Non-Battle Injuries (DNBI) when medical estimates suggest that DNBI activity will outweigh trauma. This would enable medical provision that is more tailored and appropriate to the profile of illness and injury for the climate and conditions.

Conclusion

This paper describes the common disease and non-battle injuries (DNBI) presentations and burden of work in a busy Role 1 MRS in a low tempo, hot climate exercise. As such, it profiles a different spectrum of medical requirements to the well-documented trauma injuries common to previous kinetic deployments such as OP HERRICK [12]. Whilst the data presented here is that of a non-battle encounter, there are lessons to be learnt for medical planning; such as the surge of patient care during the

acclimatisation phase. This paper looks at the breakdown of clinical caseload which can further inform mission specific preparation for Primary Health Care in future strike operations, when compared against a well-established trauma, or Pre-Hospital Emergency Care footing.

Key words: Saif Sareea 3, hot, desert, epidemiology, Role 1

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Tables: 3

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